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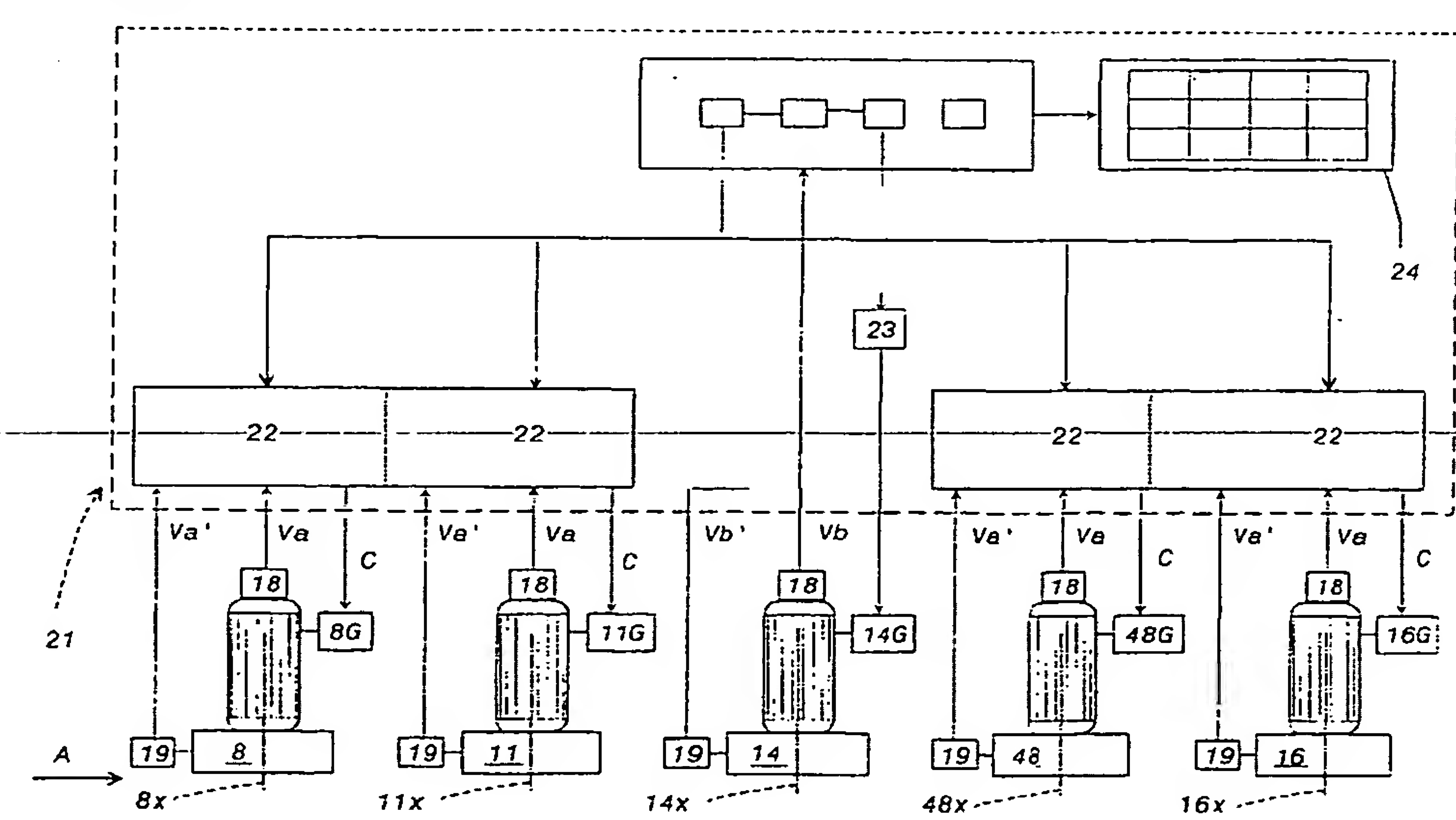
(54) **Machine for the automated manufature of infusion bags**

(57) A machine for the manufacture of bags (1) containing infusionable substances comprises a succession of work stations ordered along a pass line (A): a station (5) from which a film divided into two strips (2, 3) is directed toward a station (8) where measures of the substance are dispensed onto one of the strips (2), followed by a station (11) at which the two united strips (2, 3) are heat sealed together to form one continuous strip; passing first through a longitudinal cutting station (12) then through a transverse cutting station (14), the strip is divided up into individual bags (1) which are stacked at a further station (16) in the requisite number for a given packaging format. The single stations are driven by relative motors (8m, 11m, 14m, 16m) independently of and in concert with one another, adopting a control system whereby the angular position of the relative machine axis (8x, llx, 14x, 16x) is monitored electrically, and one such axis (14x) provides a master axis to which the others are subordinate. The axes (8x, 11x, 14x, 16x) are all interlocked to a monitoring and control unit (21) such as will verify their angular position relative to one other in the light of variable operating parameters, namely the pattern of the single bag, production tempo and packaging format.

FIG. 3



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Description

The present invention relates to a machine intended for the automated manufacture of filter bags filled with infusionable substances, for example tea, herbal powders and similar products.

The adoption of filter bags as a means of preparing individual beverages by infusion, both in the home and in catering, is now general practice the world over: it is indeed by virtue of their simplicity and ease of use that filter bags have become so widely accepted.

In the light of this increased popularity, attempts naturally have been made to maximize the appeal of the single bag, especially by those who distribute the product on the market; one has seen improvements in retention of the particulate substance, in the rate of interaction with liquids during the time allowed for infusion, in shelf life, in ease of final packaging, and so forth...

For example, one has seen a change from the original bag, appearing as a single envelope with a finger tab label or tag attached by a thread, to the now familiar pattern incorporating two envelopes (also with thread and finger tab label, and in some cases individually wrapped), which is fashioned from a tubular blank of filter paper filled with two distinct measures of the substance and folded double (thereby obtaining a more effective release of the substance due to the larger surface area in contact with the liquid), also to the simpler type of bag consisting in a plain rectangular or circular envelope with no thread or label, which is packed generally in boxes containing one or more rows and without any additional wrapping.

Reference is made in the present specification to a machine for the manufacture of this latter type of filter bag, and in particular to individual or one-cup bags consisting in single envelopes of rectangular or circular outline, fashioned generally in pairs side by side from a pair of plain filter paper strips placed one against another and sealed along the edges, each containing a measure of the infusionable substance.

In their current form, automatic machines of the type in question (see also Italian patent n° 1 199 414 in the name of the present applicant) comprise a series of stations arranged along a substantially horizontal pass line, by which single bags of the infusionable substance are fashioned and made ready for packaging into boxes.

At a decoiling station located first in sequence along the pass line, a continuous strip of filter paper is drawn from a roll and divided longitudinally into two halves; the first half is directed beneath a station from which measures of the infusionable substance are dispensed singly, or alternatively in pairs arranged two abreast, whilst the second half is made to by-pass the dispensing station and then assume a position over the first half, covering the single or paired measures of the substance already deposited on the paper.

The station next in sequence, or rather positioned following the dispenser along the pass line, comprises means by which to heat seal the external border of the two joined halves and, where the bags are fashioned in pairs, also the mid-line dividing the measures of the infusionable substance lying two abreast on the first half; such heat seal means will consist, typically, in a pair of rollers counter-rotating about respective horizontal axes and positioned one directly above the other.

The continuous strip of bags fashioned in this way is advanced along a table toward a station at which it is severed longitudinally by means of a special cutter, and thereafter through a further station at which it is divided transversely by a second rotary cutter into a plurality of single bags. The discrete bags are then stacked in pairs at a station immediately beyond the transverse cutting station. More exactly, the bags are stacked in a given predeterminable number internally of a vertical duct, then, after descending vertically, released onto a moving horizontal surface and conveyed toward subsequent stations either incorporated into or separate from the machine, by which the end product is packed into boxes.

Each machine unit operating at the various stations mentioned above (dispenser, heat seal rollers, cutters and stackers) is set in motion by a drive system which normally will be centralized, and connected with the single units by way of mechanical transmission links comprising gears, chains or belts; the drive ratios and proportions of these are selected according to the output required from each unit, so as to maintain the production of bags steady and correct, or according to the dimensions of the end product. In other words, the machine operates to certain key parameters, namely the size of the filter bag, which if changed will require adaptation or replacement of the heat seal rollers and the dispenser, and the final packaging format, i.e. the number of bags or pairs of bags destined to make up one box.

Machines structured after this fashion by now have a long pedigree and are able to combine high output per unit of time with an appreciable guarantee of quality in respect of the finished product, but tend at the same time to betray a certain lack of "flexibility" as regards the material requirements of the manufacturer, typically the need to change quickly to a different packaging format (number of bags per box) for a given market, and possibly to make minor alterations to the size and/or shape of the bag. To change the setup of such a machine, it becomes necessary on each occasion to alter the drive ratio for each one of the stations affected by the change, making manual adjustments to the transmission link between the drive system and the machine unit and thus changing the positions occupied by the units at the start of the cycle. This is done for example with the aid of a circular graduated scale fitted to each gear, which can be used to set a new "zero" or starting point for the unit, or perhaps by changing the transmission link wholly or in part.

However, this operation inevitably dictates a stoppage that may keep the machine idle for some considerable time and in consequence can have a negative

impact on its overall productivity each time the need for such a changeover happens to arise.

Accordingly, the object of the invention is to provide a machine for the automated manufacture of filter bags containing infusionable substances, designed in such a way that the output per unit of time and the ultimate packaging format can be changed automatically without the machine itself having to stand still for prolonged periods and with no need for mechanical adjustments to made directly to any of its component parts, beyond the obvious replacement of machine units or assemblies directly influenced by the shape and size of the bag, namely the dispenser, heat seal rollers etc.; instead, the angular position of the shafts driving the various machine units is controlled directly in such a manner that the motors can be retimed in a few moments and the operating cycle of the machine restarted without delay.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- fig 1 illustrates a machine according to the present invention for the automated manufacture of filter bags containing infusionable substances, seen in a general schematic elevation;
- fig 2 illustrates the succession of steps involved in fashioning a filter bag using the machine of fig 1, starting from a strip of filter paper and terminating with the emergence of a single bag, viewed partly in plan and partly in a side elevation;
- fig 3 is a block diagram of the elements making up the control system to which the drives of the machine disclosed are interlocked;
- fig 4 is an enlarged detail of the machine shown in fig 1, illustrating the manner in which longitudinal and transverse cutters and a stacking station are connected to respective drives, viewed schematically and in elevation with certain parts omitted better to reveal others.

As discernible from the accompanying drawings, and in particular fig 2, the present invention relates to an automatic machine for the continuous production of filter bags 1 containing an infusionable substance (typically tea leaves, camomile flowers, etc.).

The bag 1 (see fig 2) is of the type fashioned from two breasted strips 2 and 3 of filter paper enveloping a measure 4 of the substance and heat sealed together at the edges. Fig 2 shows a continuous strip of such bags 1 which in the particular example illustrated are generated in pairs two abreast by the various units of the machine for reasons concerned purely with output, albeit the principle clearly would stay the same were the bags to be generated in a single file utilizing two narrower strips: in short, the inventive concept underlying the machine remains unaffected.

The machine in question incorporates a succession of stations (see fig 1) arranged along a horizontal pass line indicated by the arrow denoted A.

Located first in sequence along the pass line A is a station 5 at which a continuous film F of filter paper is decoiled from a bulk roll 6 secured to a freely revolving pivot 37; the film can be fed initially in one piece and then divided as in the example of the drawings, or alternatively, two separate rolls might be utilized.

The decoiling film F is directed by way of transfer rollers 38 toward longitudinal cutting means 7, shown in the drawings as a circular cutter 7c anchored to a fixed structure 36 of the machine, and divided into two films F2 and F3 of identical width that will be heat sealed together ultimately to fashion the bag 1 (as discernible from fig 2).

Thereafter, the first strip 2 or first film F2 is directed into a second station 8 from which measures 4 of the infusionable substance are dispensed through the agency of metering means 9 embodied as a revolving drum 39 and set in motion by a relative motor 8m; the measures 4 are deposited pair by pair in succession on the advancing strip 2, two abreast (see fig 2). The drum 39 in turn receives the substance from a hopper unit 40 (conventional in embodiment and therefore illustrated only in part) mounted above and connected to the drum.

Following the longitudinal cut, the second strip 3 or second film F3 advances toward the second station 8, which it joins at a given point beyond the revolving drum 39: in practice the second strip 3 is caused to by-pass the second station 8, being diverted instead through transfer means 10 afforded by a set of idle rollers 10r positioned above the drum 39, thereafter descending and covering the first strip 2 with the measures 4 already in place.

The two joined strips 2 and 3 advance toward a third station 11 at which they are heat sealed together in the longitudinal and transverse directions. This third station comprises a pair of contrarotating rollers 11a and 11b set in motion by a drive comprising a single motor 11m and a timing belt 41; the two rollers 11a and 11b present a contoured and heated contact surface (conventional in embodiment and therefore indicated only in part) such as will seal a peripheral area of the strips 2 and 3 circumscribing each measure 4 (the outline will be selected on the basis of packaging and marketing requirements) and thus generate a plurality of single bags 1, still united in a continuous strip and advancing in pairs two abreast (as indicated to advantage in fig 2).

Referring to fig 1, the two contrarotating rollers 11a and 11b are mounted overhung, each rotatable about a pivot coinciding with the relative horizontal axis of rotation, denoted 11ay and 11by. The pivots 11ay and 11by are associated permanently, to the front of the machine, with relative moving arms 42 associated in their turn at the rear of the machine with respective ends of a pair of rods 25 and 26; the two rods combine to create a toggle mechanism 27, connected pivotably to the end of a pneumatic actuator 28 (a cylinder in practice) disposed horizontally and anchored to the aforementioned fixed

structure 36, by which the two rollers 11a and 11b can be drawn together and spread apart respectively at the start of a cycle and when the cycle is interrupted, in response to control media that will be described more fully in due course.

Continuing along the pass line beyond the heat seal rollers 11a and 11b, the advancing strip of bags 1 is cut longitudinally at a sixth station 12 through the agency of a second circular cutter 13 and divided into two halves, with the result that two parallel files of bags 1 are generated (the numbering of the stations is derived from the chronology of the appended claims, hence the slight discrepancy in terms of descriptive sequence when reading the specification).

More exactly, the second longitudinal cutter 13 (see figs 1 and 4) is positioned beneath the pass line A followed by the continuous strip of bags 1, whilst the station 12 also comprises a reaction wheel 29 located above the cutter 13 and the strip, mounted rotatably to a block 30 secured to the fixed structure 36 of the machine. 29a denotes a pair of pinch wheels positioned immediately preceding the cutter 13.

The strip of bags 1 (not separated longitudinally as yet) can be restrained by means of a clamp element 31 located between the two wheels 29 and 29a and anchored to the selfsame block 30, of which the operative end portion is capable of movement vertically between an inactive raised position, distanced from the strip in such a manner as to allow its advance, and an active lowered position of stable contact in which the strip is prevented both from advancing any further and from returning toward the third station 11 in the event of the operating cycle being interrupted.

Once beyond the sixth station 12, the two continuous strips of bags 1 are severed transversely at a fourth station 14 comprising a first cutter 15, consisting in a roller 15r fitted with a double edged blade, in such a way as to generate the discrete bags (see fig 2); the cutter 15 is driven by a relative motor 14m, which also transmits rotation to the second cutter 13 by way of a further timing belt 14c.

The cut bags 1 are collected and stacked at a fifth station 16 through the agency of means 17 by which the stacks are formed according to subsequent packaging requirements and in predetermined number.

More exactly, the means 17 in question are embodied as a vertical duct 32 with open top and bottom ends by which the single bags 1 are accommodated two abreast, one on top of another (creating a pair of stacks P1 and P2 each composed of single bags), and supported initially on two bearers 48 before dropping down onto a movable platform denoted 33.

It is by these two bearers 48, disposed one on either side of the duct 32, that the bags 1 are divided and sorted into the number per relative stack P1 and P2 required to make up the final package. The bearers 48 are essentially C-shaped, and positioned facing one another with the active top finger ends insertable through respective slots afforded by the walls of the duct 32; the bottom ends are pivotably associated with a support 49 which is secured in its turn to a belt 50 driven by a further motor 48m, in such a way that the bearers 48 can be set in motion along the duct 32.

The bearers 48 are designed to spread apart and draw together respectively into open and closed positions, utilizing the pivotable association mentioned above (see fig 4): anchored by their bottom ends to the piston rod 48a of a vertically disposed actuator 48p associated rigidly with the support 49, the bearers 48 can be distanced from one another by the actuator 48p (as illustrated in fig 4) when the stack of bags 1 is due to drop onto the platform 33, then drawn together to create a temporary second platform above and thus separate the stacked bags 1, already deposited on the movable platform 33 and descending toward the bottom of the duct 32, from the cut bags continuing to enter above and destined to make up the next package.

The platform 33 is capable of ascending and descending movement within the duct 32, its operation timed in relation to the opening and closing movement of the bearers 48 in such a way that bags 1 can be assembled in the numbers required for subsequent packaging steps at other stations.

To obtain this same ascending and descending movement, the platform 33 is rigidly associated with a support element 43 capable of sliding along a rod 44 anchored to the fixed structure 36 of the machine; the support element 43 is set in motion by way of a lever arm 45 pivotably associated at one end with the element and at the opposite end with the fixed structure 36, and coupled also to a crank mechanism comprising a rod 46 of which one is anchored to a slot 45a afforded by the arm 45 and the remaining end to a wheel 47 driven by a motor denoted 16m. In this way, the arm 45 is invested with alternating motion and the platform 33 supporting the bags 1 will rise and fall with each revolution of the power driven wheel 47.

Each time the movable platform 33 reaches its lower travel limit, a diverter 51 located at the bottom of the duct 32 directs the two stacks P1 and P2 of bags 1 in a horizontal direction toward the aforementioned packaging stations (not illustrated in the drawings, being conventional in embodiment and no more than incidental to the present invention).

The diverter 51 is set in motion by a rod 52 connected via a transmission link, denoted 53 in its entirety, to a cam 47c which is also connected to the motor 16m driving the platform in such a way that the diverter and platform 51 and 33 are permanently synchronized.

Located at the top end of the stacking station 16 is an arm 34 by which the bags 1 are directed forcibly into the duct 32; disposed transversely to the duct and anchored by way of a fulcrum pivot 35 to the fixed structure 36 of the machine, the arm 34 is caused to alternate in time with the movements of the remaining stations, being connected likewise to the motor 14m driving the first

cutter 15, and to move in a vertical direction V in such a way that its free end 34a will impinge firmly on the bags 1 advancing from the first cutter 15, thus favouring and ensuring their correct entry into the duct 32.

The main machine units at the majority of the stations described thus far, and in particular the dispensing station 8, the heat seal station 11, the transverse cutting station 14 and the stacking station 16, are driven by dedicated motors, i.e. 8m, 11m, 14m and 16m respectively, also 48m in the case of the bearers 48; each motor operates both independently of and in timed coordination with the remainder, providing e.m.f. for a respective machine axis 8x, 11x, 14x, 16x and 48x of which the angular position is controlled electrically.

In other words, each single axis 8x, 11x, 14x, 16x and 48x performing a given work cycle in the machine is controlled independently in respect of predetermined operating parameters (described in due course) by way of elements connected directly and indirectly to the movement of the selfsame axis.

More exactly, one of these electrically controlled axes, and in particular the axis 14x driving the first or transverse cutter 15, provides the master axis to which all remaining axes are referred: in this way, it becomes possible to establish operating parameters for the start of the cycle or for changing these selfsame parameters during the cycle.

All axes of the machine, the term "axis" signifying the electric motor together with the unit 8g, 11g, 14g, 16g and 48g by which its operation is controlled (as indicated in the diagram of fig 3) are interlocked to a monitoring and control unit 21 (e.g. utilizing printed circuit modules) such as will keep track of their angular positions one relative to another on the basis of variable operating parameters, i.e. the type of cycle adopted in manufacture of the filter bags 1, the number of bags per package, also the pattern and size of the single bag.

To this end, still referring to fig 3, each axis 8x, 11x, 14x, 16x and 48x is equipped with respective first means 18 (typically conventional encoders keyed directly to the relative motor shaft) by which to monitor the position of the axis both as an angular value and in relation to the corresponding station 8, 11, 14, 16 and 48, also second means 19 (typically conventional proximity sensors connected indirectly to the relative motor shaft) by which to determine the absolute position in space of the machine components associated with the single axes 8x, 11x, 14x, 16x and 48x, i.e. the drum 39, heat seal rollers 11a and 11b, first cutter 15, platform 33 and bearers 48.

In short, each machine component is monitored in terms both of its expected position at a given moment in the context of the operating cycle, and of its prescribed absolute position in the light of the aforementioned operating parameters, which are pre-programmable by way of the monitoring and control unit 21.

As discernible from fig 3, the monitoring and control unit 21 might comprise one circuit module 22 for each one of the axes 8x, 11x, 14x, 16x and 48x, which will monitor and control the respective angular position on the basis of values Va and Va' received by the module from the first and second position sensing means 18 and 19, and of values Vb and Vb' derived from the master axis 14x. Alternatively, use could be made of multiple modules controlling a plurality of axes (i.e. depending on the design of the modules) as indicated in fig 3, where a single module 22 controls two axes.

In addition, the monitoring and control unit 21 will comprise means 23 by which to vary the speed of the master axis 14x and as a result obtain a simultaneous adjustment in speed of the subordinate axes driving the remaining stations of the machine, by virtue of their connection through the respective modules 22. To provide control over speed variations, the monitoring and control unit 21 is connected in turn to a unit 24 such as will display and allow manual or programmable changes to the variable operating parameters utilizing suitable software.

With a machine structured in this way, a manufacturer can bring about swift changes in the operating cycle without necessarily stopping the machine for lengthy periods to allow adjustments, and without any loss of control over the machine units as regards their normal operation. In the case of a straightforward variation in the operating speed and therefore the output of the machine, the act of simply entering a new output value gives place to a direct variation in the speed of the master motor; as a result, all of the modules 22 will take up the new value from the master and pilot the control unit of the connected motor (see arrows C in fig 3) to adjust and adapt the speed of the relative shaft to the new value. Again, in the slightly less simple case of a change to a new packaging format, for example with stacks P1 and P2 comprising a different number of bags, the relative combination is selected by way of the unit denoted 24; this then generates an instruction by way of the interlocked modules 22 to run the relative motors (16m and 48m in this instance) at new angular velocities such as will produce the new format. Accordingly, with the various motors and the corresponding axes controlled electrically, changes of speed and format can be effected swiftly, with machine down times having very little influence on output.

The solution of first sensing means 18 keyed directly to the motor shafts is instrumental in enabling the monitoring and control unit to recognize the angular position of the relative machine axis at any given moment, whilst with second absolute position sensing means 19 applied preferably to the low speed axes or located along the trajectory of the components driven by them, the monitoring and control unit is able to establish the position in space of a given component without reference to the number of revolutions that must be completed by the shaft of the relative motor per operating cycle, i.e. information dependent upon the cycle.

Another example of the flexibility afforded by the machine disclosed is reflected in the ease with which

the lines of the heat seal can be varied in relation to the subsequent transverse cut, so as to obtain a correct alignment between the heat seal and the cut; the operation is simple, and effected by way of the relative motor 11m. This same flexibility is similarly evident in the process whereby the measures 4 of the substance are dispensed onto the strip 2, inasmuch as the position of the measures in relation to the stroke made subsequently by the transverse cutter 15 can be altered by piloting a corresponding adjustment of the motor 8m which drives the dispensing means 9.

With machine units interlocked to an automatic control system as described and illustrated, positioning and timing adjustments can be made with a simplicity not afforded by prior art machines having all-mechanical transmission linkages. Furthermore, in the event of an interruption occasioned by a stall in the cycle or a change to a different style of bag 1, this is handled directly by the monitoring and control unit 21 which, when the machine restarts, will readjust the axes as required according to the relative position occupied by each one at the moment when the stoppage occurred, and according to the absolute position in the context of the operating cycle.

In addition, the opening and closing movement of the heat seal rollers 11a and 11b could be automated so as to prevent any damage to the strips 2 and 3 occupying the station 11 at the moment when a stoppage occurs.

As the rollers 11a and 11b open, the monitoring and control unit 21 will detect the movement and cause the clamp element 31 to descend, restraining the strips of bags 1 currently advancing through the longitudinal cut; these would otherwise be pulled back toward the heat seal rollers 11a and 11b and the already formed bags 1 consequently lost.

A further advantage afforded by the machine disclosed is that the components of one or more stations could be embodied as interchangeable modular assemblies and selected on the basis of the aforementioned variable operating parameters. When changing to a different size of film F2 and F3 utilized for a given pattern of bag 1, for example, the heat seal rollers 11a and 11b might easily be released from the arms 42 and replaced with others; the arms thus provide means by which the assembly is associated removably with the respective electric motor 11m, this being a non-interchangeable part.

Claims

1. A machine for the automated manufacture of bags (1) containing infusionable substances, in particular a bag of the type fashioned from two joined strips (2, 3) of filter paper enveloping at least one measure (4) of the substance,
characterized
   - in that it comprises a plurality of stations ordered along a pass line (A):

     a first station (5) at which a first film (F2) of filter paper serving to establish a first strip (2) is decoiled from a roll (6) and directed toward a second station;
     a second station (8) at which a measure (4) of the infusionable substance is dispensed onto the advancing first strip (2) by metering means (9) positioned along the pass line (A), and at which the selfsame first strip (2) is joined and covered at a point beyond the metering means (9) by a second film (F3) constituting the second strip (3);
     a third station (11) at which the united strips (2, 3) are heat sealed longitudinally and transversely by a pair of contrarotating rollers (11a, 11b), thereby generating a continuous strip of bags (1) ordered in linear succession;
     a fourth station (14) at which the continuous strip is divided by a first transverse cutter (15) into a plurality of discrete bags (1);
     a fifth station (16) at which bags (1) advancing from the fourth station (14) are taken up by stacking means (17) and allowed to accumulate in predetermined number as required for subsequent packaging;

   - in that at least the second, third, fourth and fifth stations (8, 11, 14, 16) are set in motion by drive means (8m, 11m, 14m, 16m) operating independently of and synchronously with one another, each identifiable as a relative machine axis (8x, 11x, 14x, 16x) of which the angular position is electrically controlled;
   - in that at least one of the electrically controlled axes (8x, 11x, 14x, 16x) functions as a master axis to which all the remainder are subordinate; and,
   - in that all the electrically controlled axes (8x, 11x, 14x, 16x) are interlocked to a monitoring and control unit (21) such as will verify their angular position one in relation to another on the basis of variable operating parameters, namely the number of bags (1) manufactured per unit of time, the number of bags per single package and the size and/or pattern of the individual bag.

2. A machine as in claim 1, wherein the bags (1) of the continuous strip are arranged in pairs, two abreast and ordered in linear succession: comprising a sixth station (12) located between the third and fourth stations (11, 14) and comprising a second cutter (13) by which the continuous strip is cut longitudinally into two parts in such a way as to create two

parallel lines of bags advancing one alongside the other.

3. A machine as in claim 1, wherein the master axis (14x) to which the remaining axes are subordinated coincides with the drive means (14m) of the first transverse cutter (15) operating at the fourth station (14).

4. A machine as in claim 1, wherein each one of the electrically controlled machine axes (8x, 11x, 14x, 16x) is equipped with first means (18) by which to monitor the angular position of the axis in relation to the corresponding station (8, 11, 14, 16), and second means (19) by which to monitor the absolute position in space of the machine units (9, 11a, 11b, 15, 17) set in motion by the respective axes (8x, 11x, 14x, 16x), the absolute position being a function of variable operating parameters programmable by way of the monitoring and control unit (21).

5. A machine as in claim 4, wherein the monitoring and control unit (21) comprises one circuit module (22) governing each of the electrically controlled axes (8x, 11x, 16x) subordinate to the master axis (14x), such as will monitor and control the angular position of the corresponding axis on the basis of values (Va, Va') received by the module from the first and second position sensing means (18, 19), and of values (Vb, Vb') generated by the master axis (14x).

6. A machine as in claim 4, wherein the monitoring and control unit (21) comprises one circuit module (22) governing at least two of the electrically controlled axes (8x, 11x, 16x) subordinate to the master axis (14x), such as will monitor and control the angular position of the corresponding axes on the basis of values (Va, Va') received by the module from the first and second position sensing means (18, 19), and of values (Vb, Vb') generated by the master axis (14x).

7. A machine as in claim 1, wherein the monitoring and control unit (21) comprises means (23) by which to vary the operating speed at least of the master axis (14x), and is connected also to a unit (24) such as will both display and allow manual or programmable changes to the variable operating parameters.

8. A machine as in claim 1, wherein the first station (5) comprises a roll (6) from which a single film (F) is decoiled and divided successively into two parts (F2, F3) by longitudinal cutting means (7) to create the two strips (2, 3), of which the part (F3) providing the second strip (3) is caused to by-pass the second station (8) through the agency of transfer means (10) and joined thereafter to the first strip (2) at a given point on the pass line (A) beyond the metering means (9).

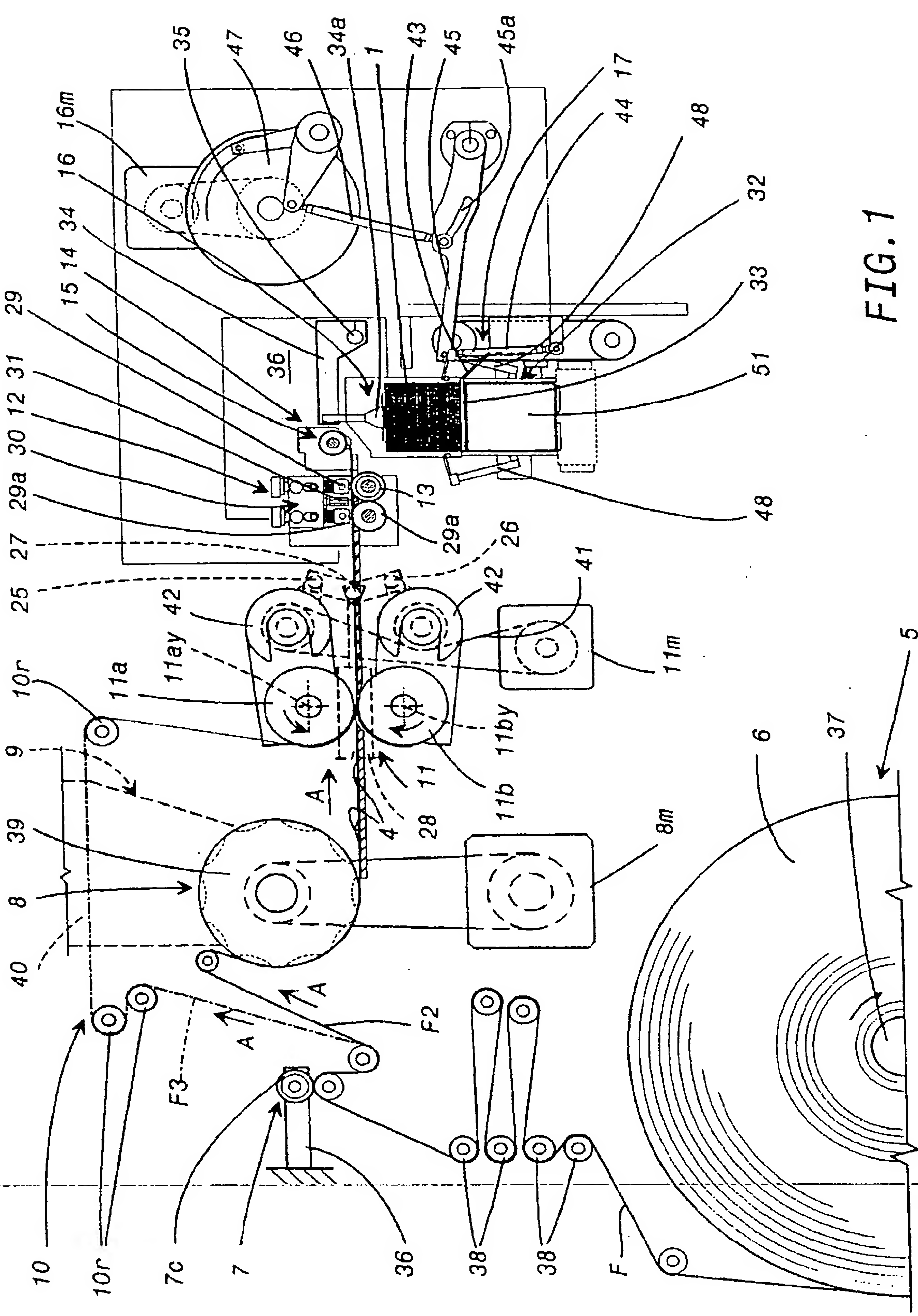
9. A machine as in claim 1, wherein any one or any number of the stations (5, 8, 11, 14, 16) comprises machine units (6, 9, 11a, 11b, 15, 17) consisting in modular assemblies that are interchangeable according to the variable operating parameters and associated removably with the relative electric drive means (8m, 11m, 14m, 16m), which are non-interchangeable.

10. A machine as in claim 1, wherein the rollers (11a, 11b) of the third station (11) are contrarotatable about respective horizontal axes (11ay, 11by) and disposed one above the other, each associated at the rear of the machine with respective ends of a pair of rods (25, 26) combining to create a toggle mechanism (27) connected pivotably to one end of a horizontally disposed pneumatic actuator (28) by which the two rollers (11a, 11b) can be drawn together and spread apart, in response to a command from the monitoring and control unit (21), respectively at the start of a cycle and when the cycle is interrupted.

11. A machine as in claim 2, wherein the continuous strip of bags (1) is divided longitudinally by a second cutter (13) located beneath a pass line (A) followed by the strip, directly under at least one reaction wheel (29) mounted rotatably to a block (30) secured to the machine above the pass line (A), and the sixth station (12) further comprises a clamp element (31) occupying a position following the reaction wheel (29) and preceding the cutter (13) relative to the pass line, anchored slidably to the block (30) and capable of movement vertically between an inactive raised position, distanced from the strip in such a manner as to allow its advance, and an active lowered position of contact assumed in response to a command from a monitoring and control unit (21) in the event of the operating cycle being interrupted, whereby the strip is prevented both from advancing any further and from returning toward the third station (11).

12. A machine as in claim 1, wherein stacking means (17) at the fifth station (16) consist in at least one vertical duct (32) with open top and bottom ends designed to accommodate the single bags (1) one on top of another and resting on a platform (33) located within and capable of movement along the duct (32), into which the bags (1) are directed forcibly by an arm (34) disposed transversely and adjacent to the open top end, anchored by way of a fulcrum pivot (35) to a fixed structure (36) of the machine and capable thus of alternating movement synchronously with the movements of the remaining stations and in a vertical direction (V), in such a way

that its free end (34a) will enter into contact with the bags (1) advancing from the fourth station (14) and favour their entry into the duct (32).



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45a
17
44
48
32
16m
16
34
14
15
29
31
12
30
29a
27
25
36
33
51
48
13
29a
26
41
42
42
11ay
11a
10r
9
39
8
40
11m
11by
11
11b
28
4
A
8m
5
6
37
A
A
F2
F3
10
10r
7c
7
36
38
38
F

FIG. 1

FIG. 2

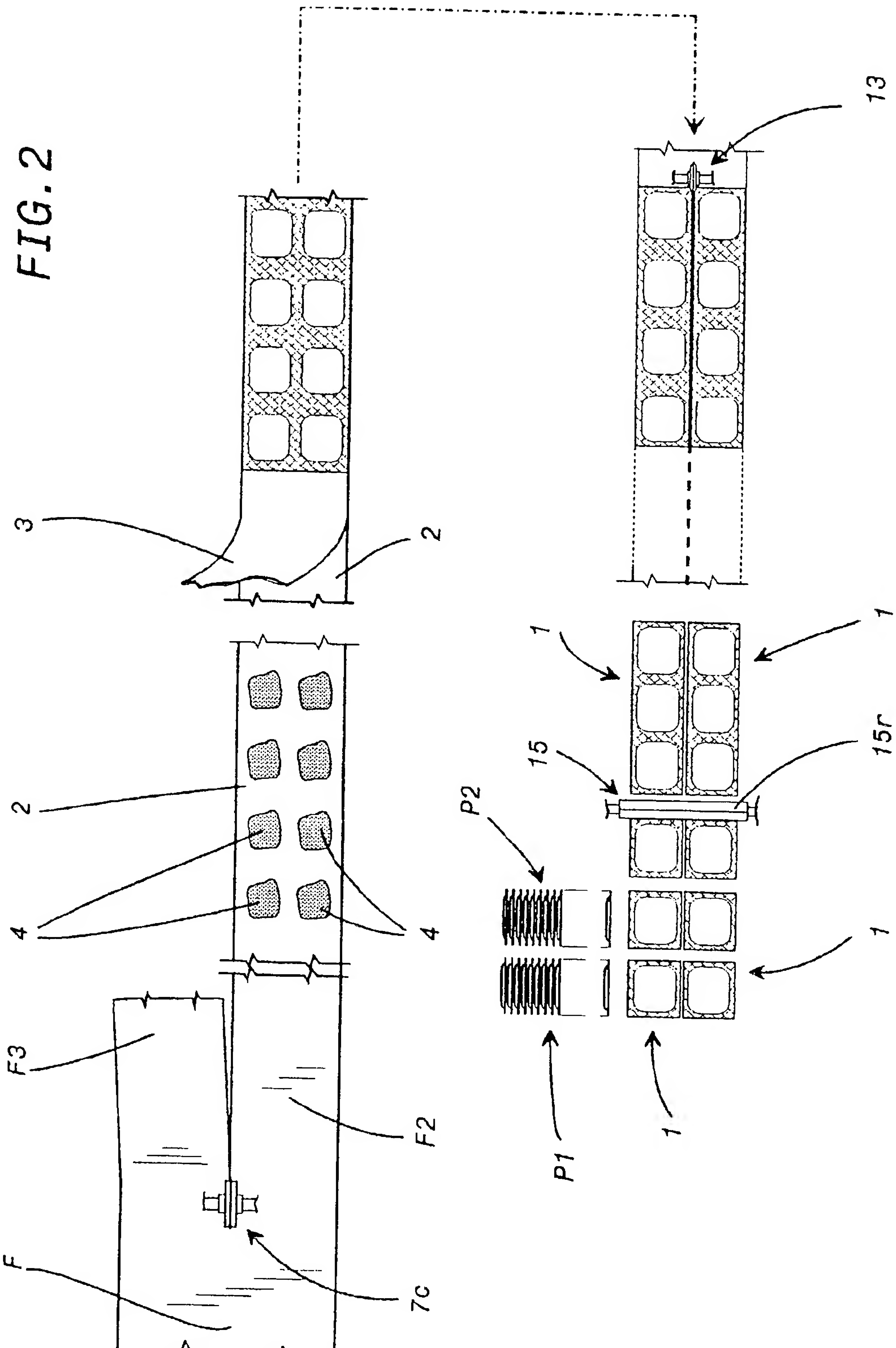


FIG. 3

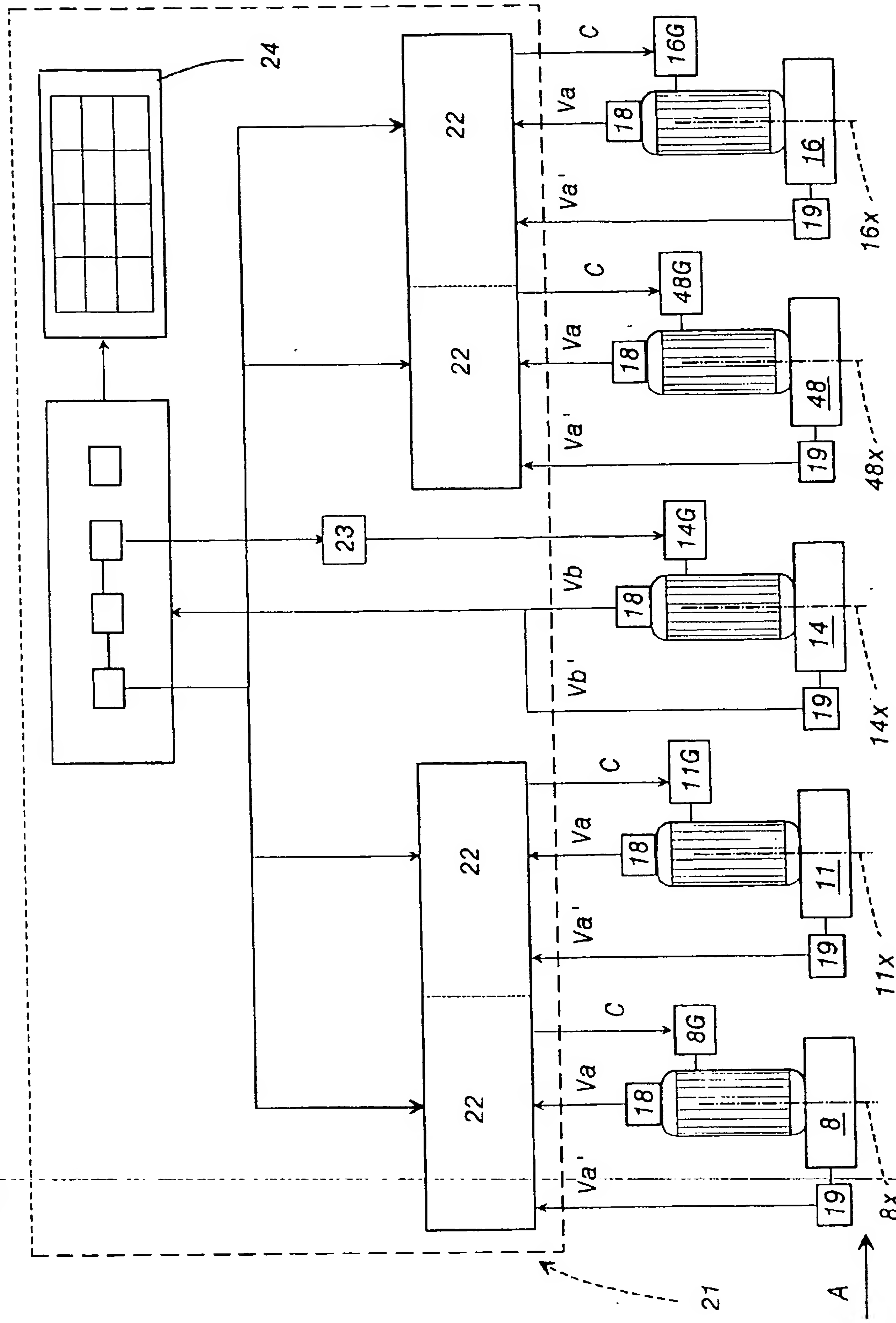
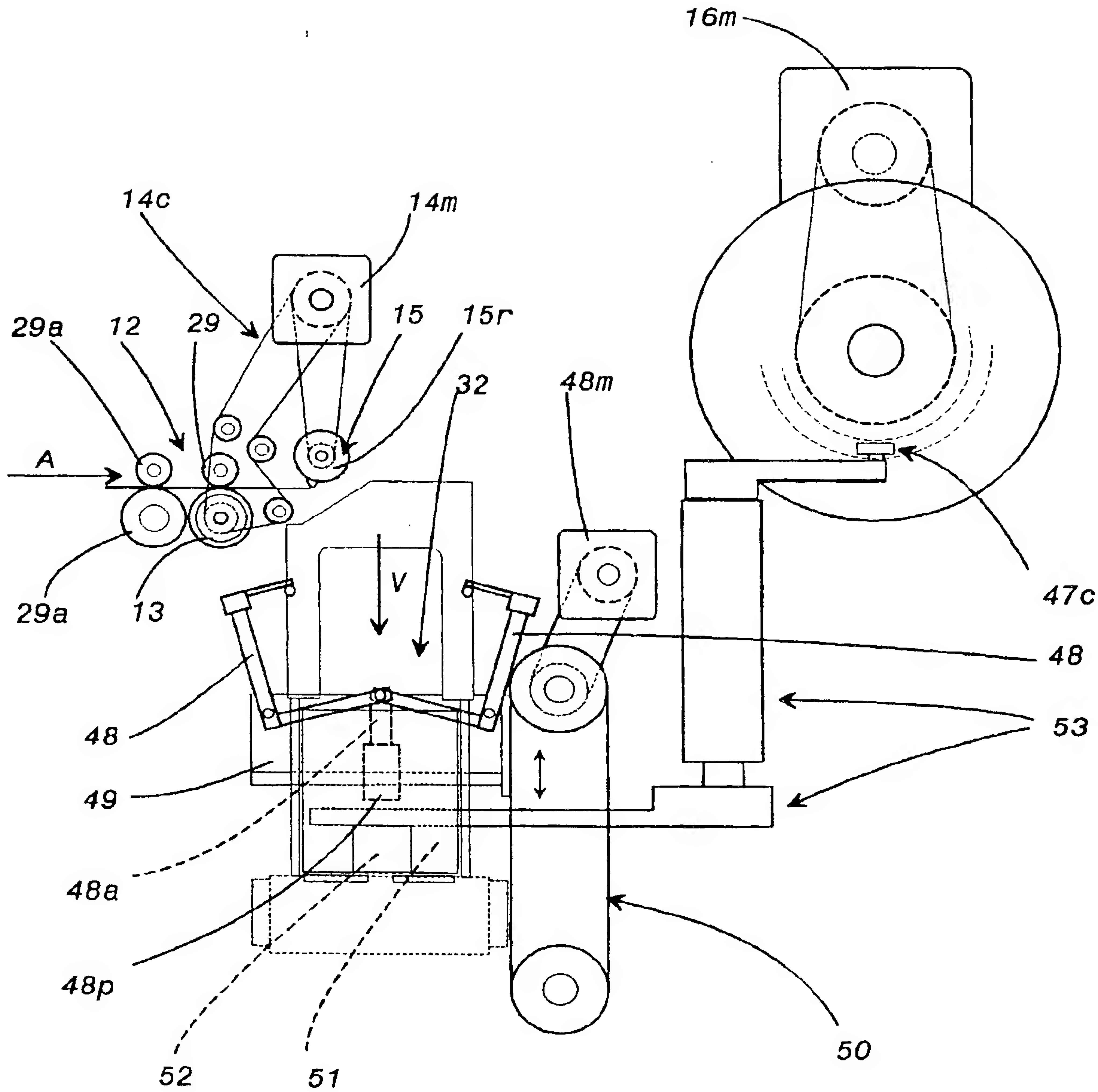

24
22
22
22
22
23
C
Va
Va'
Vb
Vb'
16G
48G
14G
11G
8G
18
19
16
48
14
11
8
16x
48x
14x
11x
8x
21
A

FIG. 4


16m
14c
14m
29a
12
29
15
15r
32
48m
A
47c
V
29a
13
48
48
53
49
48a
48p
50
52
51

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0192

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	EP 0 548 057 A (A.G.) * column 5, line 8 - column 8, line 34; figures *	1,2	B65B29/02 B65B57/16
Y	US 4 722 168 A (S. HEANEY) * column 4, line 3 - column 6, line 20 * * column 7, line 49 - column 8, line 10; figures *	1,2	
Y	WO 93 07061 A (I. GAYLOR) * claims 10,11; figure 4 *	2	
A	EP 0 095 542 A (N. GOEDERT) * page 4, line 26 - page 6, line 7; figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 July 1997	Jagusiak, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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